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(54) Method for distributing fuel within an augmentor

Verfahren zum Verteilen von Brennstoff in einem Nachbrenner

Procédé pour la distribution de combustible dans un dispositif de post-combustion

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(56) References cited:
DE-A- 2 329 346
FR-A- 2 709 342
GB-A- 751 098
GB-A- 2 216 999
GB-A- 2 265 704

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[0001] This invention relates to augmentors for gas turbine engines in general, and more specifically to methods and apparatus for distributing fuel within an augmentor.

[0002] Augmentors, or "afterburners", are a known means for increasing the thrust of a gas turbine engine. Additional thrust is produced within an augmentor when oxygen contained within the core gas flow of the engine is mixed with fuel and burned. In some instances, additional thrust is produced by mixing and buming fuel with cooling, or bypass, air entering the augmentor through the inner liner of the augmentor shell as well. Providing successful methods and apparatus for mixing fuel with all the available oxygen continues to be a problem for engine designers, however, due to the harsh environment in the augmentor.

[0003] In early augmentor designs, fuel spray rings and flame holders were positioned directly in the core gas path to deliver the fuel in a circumferentially distributed manner and to maintain the flame once ignited. An advantage of the fuel spray rings is that it is possible to evenly distribute fuel about the circumference of the augmentor at any particular radial position. Different diameter spray rings distribute fuel to different radial positions within the augmentor. Mechanical flame holders were provided that acted as an aerodynamic bluff body, creating a low velocity wake within an area downstream. The fuel spray ring and mechanical flame holder designs were acceptable because the core gas flow temperature was within the acceptable range of the spray ring and flame holder materials. Modern gas turbine engines, however, operate at temperatures which make positioning spray rings and flame holders in the core gas path neither practical nor desirable. In addition, spray rings and flame holders present flow impediments to the core gas flow and therefore negatively affect the performance of the engine.

[0004] GB-A-2216999 discloses a fuel spray bar with means for air cooling of the spray bar.

[0005] United States Patent No. 5,385,015, discloses an augmentor design wherein fuel is distributed from a series of vanes circumferentially disposed around a center nose cone. The vanes include a plurality of fuel distribution apertures positioned on both sides of a line of high pressure air apertures. The fuel distribution apertures provide fuel distribution and the line of high pressure air apertures collectively provide pneumatic bluff bodies analogous to prior art mechanical flame holders. An advantage of this design is that the elimination of the spray rings and flame holders in the core gas path avoids the temperature/material problem and helps minimize pressure drops within the augmentor. A difficulty with this design is that th spacing between vanes at the outermost radial positions makes it more difficult to achieve a uniform circumferential distribution of fuel at the outermost radial positions. This is particularly true when the augmentor is deployed in a high altitude, low velocity situation.

[0006] For a better understanding, it is necessary to appreciate the environment in which high performance gas turbine engines operate. Aircraft utilizing high performance gas turbine engines typically operate in a flight envelope that encompasses a wide variety of atmospheric conditions. At sea level, one or more fuel pumps provide the maximum flow rate of fuel to the engine through fixed piping and orifices at the maximum amount of pressure. At higher altitudes, a lower fuel flow rate is required, but the geometries of the fuel piping and orifices do not change. As a result, the pressure of the fuel exiting the constant area orifices is reduced. Reducing the pressure of the fuel exiting the fuel distribution apertures decreases the distance that the fuel will travel circumferentially within the augmentor into the core gas flow path.

[0007] What is needed, therefore, is a method and apparatus for distributing fuel in an augmentor that is tolerant of higher temperatures, that causes minimal pressure drop within the augmentor, and that uniformly distributes fuel circumferentially within the augmentor under a variety of environmental conditions.

[0008] From a broad first aspect the invention provides method for distributing fuel within an augmentor as claimed in claim 1.

[0009] According to another aspect of the present invention there is provided an apparatus for distributing fuel within a gas turbine engine augmentor as claimed in claim 5.

[0010] A preferred embodiment of the invention will now be described by way of example only with reference to the accompanying drawings, in which:

FIG. 1 shows a diagrammatic sectional view of a gas turbine engine.

FIG. 2 shows a diagrammatic view of an augmentor, shown from the rear of the engine.

FIG. 3 shows an enlarged sectional view of an augmentor.

FIG. 4 shows a sectional view of the vane shown in FIG. 3.

[0011] Referring to FIG. 1, a gas turbine engine 10 may be described as comprising a fan 11, a compressor 12, a combustor 14, a turbine 16, and an augmentor 18. Air entering the fan 11 is divided between core gas flow 20 and bypass air flow 22. Core gas flow 20 follows a path initially passing through the compressor 12 and subsequently through the combustor 14 and turbine 16. Finally, the core gas flow 20 passes through the augmentor 18 where fuel 19 (see FIG. 4) is selectively added, mixed with the flow 20 and burned to impart more energy to the flow 20 and consequently more thrust exiting the nozzle 24 of the engine 10. Hence, core gas flow 20 may be described as following a path essentially parallel to the axis 26 of the engine 10, through the com-

pressor 12, combustor 14, turbine 16, and augmentor 18. Bypass air 22 also follows a path parallel to the axis 26 of the engine 10, passing through an annulus 28 along the periphery of the engine 10.

[0012] FIG. 2 shows a diagrammatic view of the augmentor 18 identified in FIG. 1, as viewed from the rear of the engine 10. The augmentor 18 includes a nose cone 30, a case 32 having an inner lining 34 and an outer wall 36, and a plurality of circumferentially disposed vanes 38 extending radially outward from the nose cone 30 to the inner lining 34.

[0013] Now referring to FIGS. 3 and 4, a vane 38 includes a pair of side walls 40 and an aft wall 42, and a plurality of fuel apertures 44 and pressurized gas apertures 46 extending through the side walls 40. The side walls 40 and the aft walls 42 define an interior region 48. The aft wall 42 is disposed substantially perpendicular to the side walls 40.

[0014] The fuel apertures 44 within the vanes 38 are disposed in a pattern extending from the nose cone 30 to the inner lining 34. At a particular position on the vane 38, core gas flow 20 will pass by at least one of the fuel apertures 44 within the pattern. In some instances, fuel apertures 44 within the pattern may be disposed such that core gas flow 20 passing a first fuel aperture 44 will pass by one or more aligned fuel apertures 44 disposed aft of the first fuel aperture 44. At some or all of the positions on the vane 38 where a fuel aperture 44 is located, a pressurized gas aperture 46 will be located forward of all the fuel apertures 44 at that position. As a result, core gas flow 20 passing by that particular pressurized gas aperture 46 will also pass by the fuel aperture(s) 44 located aft of the pressurized gas aperture 46, unless an obstruction is placed forward of the fuel aperture(s) 44. The aforementioned fuel and pressurized gas aperture 44,46 arrangement may be described as an assisted fuel distribution port. In each port, a pressurized gas aperture 46 and at least one fuel aperture 44 are provided, and the pressurized gas aperture 46 is positioned adjacent and forward of the fuel distribution apertures 44 in the port.

[0015] One or more fuel distributors 50, each having a head 52 and a body 54, are disposed in the interior region 48 of each vane 38. The head 52 of each fuel distributor 50 is attached to the outside surface 56 of the outer wall 36 of the case 32. Fuel feed lines 58 extending from a fuel source (not shown) couple with the head 52. One end of the body 54 is fixed to the head 52 and the other end is received within the nose cone 30. A plurality of fuel orifices 60 in the body 54 are positioned in a pattern along the length of the body 54. The pattern of fuel orifices 60 within the body 54 of each fuel distributor 50 matches the pattern of the fuel apertures 44 in the vane 38 in which the fuel distributor 50 will be mounted.

[0016] In the operation of the engine 10 (see FIG. 1), bypass air 22 entering the vanes 38 continuously exits the interior region 48 of the vanes 38 through the pressurized gas apertures 46 positioned in the side walls 40 of th vanes 38, regardless of the state of the augmentor 18. The bypass air 22 "jets", exiting the vane 38 travel a distance into the core gas flow 20 path in a direction substantially perpendicular to the direction of the path (see FIG. 4). The bypass air 22 jets create low velocity wakes in the area adjacent the fuel apertures 44. The low velocity wakes may be defined as pockets within the core gas flow 20 path around which a percentage of the core gas flow 20 has been diverted, leaving a pocket of quiescence relative to the normal flow within the core gas flow 20 path.

[0017] When the augmentor 18 is actuated, fuel 19 (see FIG. 4) is admitted into the fuel distributors 50 within the vanes 38. The fuel 19 exits the orifices 60 and the fuel apertures 44 and extends out a distance into the low velocity wakes formed in the core gas flow 20 path, in a direction substantially perpendicular to the direction of the path. The low velocity wakes "shield" the fuel exiting the fuel apertures 44 and thereby enable the fuel 19 to travel circumferentially further than it would have been able to otherwise.

[0018] After circumferentially distributing, the fuel 19 mixes with the core gas flow 20 and the bypass air 22 introduced in the core gas flow 20 and proceeds downstream. The aft walls 42 of the vanes 38 create low velocity wakes within the core gas flow 20 in the region beyond the vanes 38. The low velocity wakes provide a region for stabilizing and propagating flame.

[0019] Although this invention has been shown and described with respect to the above detailed embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail thereof may be made without departing from the scope of the claimed invention.

[0020] From the above description it will be seen that in its preferred embodiments at least, the invention provides a method and an apparatus for distributing fuel within an augmentor that is tolerant of higher temperatures, that causes minimal pressure drop within the augmentor, and uniformly distributes fuel circumferentially under a variety of environmental conditions.

[0021] An advantage of the disclosed embodiment is that the method and apparatus for distributing fuel within an augmentor for a gas turbine engine is tolerant of higher temperatures. Specifically, the fuel distribution means and flame holder means that were disposed in the core gas flow previously, are now enclosed in vanes and cooled therein. Hence, the temperature limitations of the fuel distribution means and flame holder means are significantly higher.

[0022] A further advantage is that the method and apparatus for distributing fuel causes minimal pressure losses within the augmentor. The fuel distribution means and flame holder means are disposed in an aerodynamically shaped vane, rather than directly in the core gas flow path. The circumferentially distributed vanes minimize the pressure drop within the augmentor.

[0023] A still further advantage is that the method and

apparatus for distributing fuel uniformly distributes fuel circumferentially within the augm ntor under a variety of environmental conditions. In particular, they improve the circumferential distribution of fuel within the augmentor at points within the flight envelope where aircraft are travelling at higher altitudes at relatively low speeds. A person of skill in the art will recognize that improving augmentor performance in these regions is quite desirable.

Claims

1. A method for distributing fuel within a gas turbine engine, wherein the engine includes a forward end, an aft end, a fan (11), a compressor (12), a turbine (16), and a rotational centerline (26), comprising the steps of:

    providing an augmentor (18), positioned aft of the fan, compressor, and turbine, said augmentor including a nose cone (30) centered on the rotational centerline of the engine and a case (32) having an inner lining (34) and an outer wall (36) substantially concentric with said nose cone, wherein said fan, compressor, turbine, and augmentor define a path for core gas flow (20) through the engine;
    providing a plurality of vanes (38), distributed circumferentially within said augmentor, each said vane extending radially outward from said nose cone to said inner lining, wherein each of said vanes includes:

        a pair of side walls (40) and an aft wall (42) which define an interior region (48);
        a fuel distributor (50), having a plurality of orifices (60), disposed in said interior of each said vane;
        a plurality of fuel apertures (44), extending through said side walls, aligned with said fuel distributor orifices (60), wherein fuel admitted into said fuel distributor flows through said orifices (60) and said fuel apertures (44) and into said core gas flow in a direction substantially perpendicular to said core gas flow;
        at least one pressurized gas aperture (46), extending through said vane side wall;

    providing at least one assisted fuel distribution port per vane, said port including said pressurized gas aperture (46) and at least one fuel aperture (44);
    selectively admitting fuel into said fuel distributors when said augmentor is enabled;

    wherein in said port said pressurized gas aperture (46) is positioned adjacent and forward of said fuel aperture (44), such that pressurized gas admitted into said interior region of said vane flows through said pressurized gas apertur s and into the core gas path, in a direction substantially perpendicular to the core gas path; and

    wherein said pressurized gas entering said core gas flow forward of said fuel creates a low velocity wake that enables said fuel to distribute circumferentially.

2. A method according to claim 1 wherein said distributor (50) extends lengthwise between said nose cone and said inner lining.

3. A method according to claim 1 or 2, wherein said aft wall (42) of each of said vanes is disposed such that a low velocity wake is created immediately aft of said vane (38) as said core gas flow (20) passes thereby.

4. A method according to any of claims 1 to 3, wherein said source of pressurized gas includes gas pressurized by the fan (11) and separated from said core gas flow (70).

5. An apparatus for distributing fuel within a gas turbine engine augmentor (18), wherein the augmentor (18) includes nose cone (30) centered on the rotational centerline (26) of the engine, and a case (32), having an inner lining (34) and an outer wall (36) substantially concentric with said nose cone, said apparatus comprising:

    a plurality of vanes (38), circumferentially distributed within said augmentor and extending lengthwise, radially outward from the nose cone to the inner lining, each of said vanes including a pair of side walls (40) and an aft wall (42) which define an interior region (48), and a plurality of fuel apertures (44) and at least one pressurized gas aperture (46) extending through said vane side walls;

    wherein pressurized gas admitted into said interior region of said vane flows through said pressurized gas apertures and into core gas flow passing by said vane, in a direction substantially perpendicular to said core gas flow;

    at least one fuel distributor (50), disposed in said interior region of each said vane, and having a plurality of orifices (60) for distributing fuel, wherein said orifices align with said fuel apertures (44), such that fuel admitted into said fuel distributors flows through said orifices (60) and fuel apertures (44) and into said core gas path in a direction substantially perpendicular to said core gas flow;

    wherein said at least one pressurized gas ap-

ertur (46) is positioned adjac nt and forward of all said fuel apertures (44) at a particular position; and in that said pressurized gas entering said core gas flow forward of said fuel creates a low velocity wake that enables said fuel to distribute circumferentially.

6. An apparatus according to claim 5, wherein said aft wall (42) of each of said vanes is disposed such that in use a low velocity wake is created immediately aft of said vane as said core gas flow passes thereby.

7. An apparatus according to claim 5 or 6, wherein said source of pressurised gas is bypass air created by a forwardly disposed fan and separated from said core gas flow.

8. An augmentor for a gas turbine engine comprising fuel distribution apparatus as claimed in any of claims 5 to 7.

9. A gas turbine engine, comprising:

a fan (11), disposed at a forward end of said engine;
a compressor (12);
a turbine (16); and
an augmentor (18) as claimed in claim 8.

Patentansprüche

1. Verfahren zum Verteilen von Brennstoff in einer Gasturbinenmaschine, wobei die Maschine ein vorderes Ende, ein hinteres Ende, ein Bläser (11), einem Verdichter (12), eine Turbine (16) und eine rotationsmäßige Mittellinie (26) aufweist, aufweisend die folgenden Schritte:

Bereitstellen eines Schubverstärkers (18), der hinter dem Bläser, dem Verdichter und der Turbine positioniert ist, wobei der Schubverstärker einen Nasenkonus (30) aufweist, der um die rotationsmäßige Mittellinie der Maschine zentriert ist, und ein Gehäuse (32) mit einer inneren Auskleidung (34) und einer äußeren Wand (36) im wesentlichen konzentrisch mit dem Nasenkonus, wobei der Bläser, der Verdichter, die Turbine und der Schubverstärker einen Weg für Kerngasströmung (20) durch die Maschine definieren;
Bereitstellen einer Mehrzahl von Leitelementen (38), die umfangsmäßig in dem Schubverstärker verteilt sind, wobei jedes Leitelement sich von dem Nasenkonus zu der inneren Auskleidung radial nach außen erstreckt, wobei jedes der Leitelemente aufweist:

ein Paar von Seitenwänden (40) und eine hint re Wand (42), welche einen inneren Bereich (48) definieren;
eine Kraftstoffverteilereinrichtung (50) mit einer Mehrzahl von Öffnungen (60), die in dem Inneren eines jeden Leitelements angeordnet sind;
eine Mehrzahl von Brennstofföffnungen (44), welche sich durch die Seitenwände erstrecken und mit den Brennstoffverteileröffnungen (60) ausgerichtet sind, wobei der in die Brennstoffverteilereinrichtung gelassene Brennstoff durch die Öffnungen (60) und die Brennstofföffnungen (44) und in die Kerngasströmung in einer Richtung im wesentlichen rechtwinklig zu der Kerngasströmung strömt;
mindestens eine Druckgasöffnung (46), welche sich durch die Leitelement-Seitenwand erstreckt;

Bereitstellen mindestens eines Auslasses zur unterstützten Brennstoffverteilung pro Leitelement, wobei der Auslass die Druckgasöffnung (46) und mindestens eine Brennstofföffnung (44) umfasst;
selektives Zugeben von Brennstoff in die Brennstoffverteilereinrichtung, wenn der Schubverstärker aktiviert ist;

wobei in dem Auslass die Druckgasöffnung (46) der Brennstofföffnung (44) benachbart und vor dieser angeordnet ist, so dass Druckgas, welches in den inneren Bereich des Leitelements gelassen wird, durch die Druckgasöffnungen und in den Kerngasweg in einer Richtung im wesentlichen rechtwinklig zu dem Kerngasweg strömt; und

wobei Druckgas, welches vor dem Brennstoff in die Kerngasströmung gelangt, einen Strömungsbereich mit niedriger Geschwindigkeit erzeugt, welcher eine umfangsmäßige Verteilung des Brennstoffs ermöglicht.

2. Verfahren nach Anspruch 1, wobei die Verteilereinrichtung (50) sich in Längsrichtung zwischen dem Nasenkonus und der inneren Auskleidung erstreckt.

3. Verfahren nach Anspruch 1 oder 2, wobei die hintere Wand (42) eines jeden der Leitelemente derart angeordnet ist, dass ein Strömungsbereich mit niedriger Geschwindigkeit unmittelbar hinter dem Leitelement (38) erzeugt wird, wenn die Kerngasströmung (20) daran vorbei strömt.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei die Quell für Druckgas Gas beinhaltet, welches von dem Bläser (11) komprimiert wurde und von der

Kerngasströmung (70) getrennt wurde.

5. Vorrichtung zum Verteilen von Brennstoff in einem Gasturbinenmaschinen-Schubverstärker (18), wobei der Schubverstärker (18) einen Nasenkonus (30), der um die rotationsmäßige Mittellinie (26) der Maschine zentriert ist, und ein Gehäuse (32) mit einer inneren Auskleidung (34) und einer äußeren Wand (36) im wesentlichen konzentrisch zu dem Nasenkonus aufweist, wobei die Vorrichtung aufweist:

    eine Mehrzahl von Leitelementen (38), die umfangsmäßig in dem Schubverstärker angeordnet sind und sich in Längsrichtung, radial von dem Nasenkonus nach außen zu der inneren Auskleidung erstrecken, wobei jedes der Leitelemente ein Paar von Seitenwänden (40) und eine hintere Wand (42) aufweist, welche einen inneren Bereich (48) definieren und eine Mehrzahl von Brennstofföffnungen (44) und mindestens eine Druckgasöffnung (46), welche sich durch die Seitenwände erstrecken, aufweist;

    wobei Druckgas, welches in den inneren Bereich des Leitelements gelassen wurde, durch die Druckgasöffnungen und in die Kerngasströmung, welche an dem Leitelement vorbei strömt, in eine Richtung im wesentlichen rechtwinklig zu der Kerngasströmung strömt;

    mindestens eine Brennstoffverteilereinrichtung (50), welche in dem inneren Bereich eines jeden Leitelements angeordnet ist und eine Mehrzahl von Öffnungen (60) zum Verteilen von Brennstoff aufweist, wobei die Öffnungen mit den Brennstofföffnungen (44) ausgerichtet sind, so dass Brennstoff, der in die Brennstoffverteilereinrichtungen eingelassen wird, durch die Öffnungen (60) und die Brennstofföffnungen (44) und in den Kemgasweg in eine Richtung im wesentlichen rechtwinklig zu der Kerngasströmung strömt;

    wobei allen Brennstofföffnungen (44) eine Druckgasöffnung (46) benachbart und vor dieser an einer speziellen Position angeordnet ist; und wobei das Druckgas, welches in die Kerngasströmung vor dem Brennstoff gelangt, einen Strömungsbereich mit niedriger Geschwindigkeit erzeugt, welcher eine umfangsmäßige Verteilung des Brennstoffs ermöglicht.

6. Vorrichtung nach Anspruch 5, wobei die hintere Wand (42) eines jeden Leitelements derart angeordnet ist, dass bei Verwendung unmittelbar hinter dem Leitelement ein Strömungsbereich mit niedriger Geschwindigkeit erzeugt wird, wenn die Kerngasströmung vorbei strömt.

7. Vorrichtung nach Anspruch 5 oder 6, wobei die Quelle von Druckgas Bypass-Luft ist, die von einem davor angeordneten Bläser erzeugt wird und von der Kerngasströmung abgeleitet wird.

8. Schubverstärker für eine Gasturbinenmaschine aufweisend eine Brennstoffverteilungseinrichtung, wie sie in einem der Ansprüche 5 bis 7 beansprucht ist.

9. Gasturbinenmaschine aufweisend

    einen Bläser (11), der an einem vorderen Ende der Maschine angeordnet ist;
    einen Verdichter (12);
    eine Turbine (16); und
    einen Schubverstärker (18) nach Anspruch 8.

Revendications

1. Procédé de distribution de combustible dans un turbomoteur, dans lequel le moteur comprend une extrémité avant, une extrémité arrière, une soufflante (11), un compresseur (12), une turbine (16), et un axe médian de rotation (26), le procédé comprenant les étapes qui consistent à :

    prévoir un renforçateur de poussée (18), positionné à farrière de la soufflante, du compresseur et de la turbine, ledit renforçateur de poussée comprenant un cône avant (30) centré sur l'axe médian de rotation du moteur, et un carter (32) ayant une chemise intérieure (34) et une paroi extérieure (36) sensiblement concentriques audit cône avant, ladite soufflante, ledit compresseur, ladite turbine et ledit renforçateur de poussée définissant un chemin pour l'écoulement du gaz primaire (20) à travers le moteur ;
    prévoir une pluralité d'aubes (38), réparties de manière circonférentielle à l'intérieur dudit renforçateur de poussée, chacune desdites aubes s'étendant radialement vers l'extérieur, depuis ledit cône avant jusqu'à ladite chemise intérieure, chacune desdites aubes comprenant :

        une paire de parois latérales (40) et une paroi arrière (42) qui définissent une région intérieure (48) ;
        un distributeur de combustible (50) ayant une pluralité d'orifices (60) disposés dans ladite région intérieure de chacune desdites aubes ;
        une pluralité de lumières de passage de combustible (44) s'étendant à travers lesdites parois latérales et alignées avec lesdits orifices (60) du distributeur de combustible, le combustible admis dans ledit dis-

tribut ur de combustible s'écoulant à travers lesdits orifices (60) et lesdites lumières de passage de combustible (44) et pénétrant dans ledit écoulement de gaz primaire dans une direction essentiellement perpendiculaire audit écoulement de gaz primaire ;
au moins une lumière de passage de gaz sous pression (46) s'étendant à travers lesdites parois latérales des aubes ;
prévoir au moins une ouverture de distribution forcée de combustible par aube, ladite ouverture comprenant ladite lumière de passage de gaz sous pression (46) et au moins une lumière de passage de combustible (44) ;
introduire sélectivement le combustible dans lesdits distributeurs de combustible lorsque ledit renforçateur de poussée est activé ;

dans lequel ladite lumière de passage de gaz sous pression (46) est positionnée, dans ladite ouverture, adjacente à et à l'avant de ladite lumière de passage de combustible (44), de telle sorte que le gaz sous pression admis dans ladite région intérieure de ladite aube s'écoule à travers lesdites lumières de passage de gaz sous pression et pénètre dans l'écoulement de gaz primaire dans une direction sensiblement perpendiculaire au chemin d'écoulement de gaz primaire ; et

dans lequel ledit gaz sous pression pénétrant dans ledit écoulement de gaz primaire, à l'avant dudit combustible, crée un sillage à petite vitesse, qui permet une distribution circonférentielle dudit combustible.

2. Procédé selon la revendication 1, dans lequel ledit distributeur (50) s'étend dans la direction longitudinale entre ledit cône avant et ladite chemise intérieure.

3. Procédé selon la revendication 1 ou 2, dans lequel ladite paroi arrière (42) de chacune desdites aubes est disposée de telle sorte qu'un sillage à petite vitesse soit créé immédiatement à l'arrière de ladite aube (38) lorsque ledit écoulement de gaz primaire (20) passe à travers elle.

4. Procédé selon l'une quelconque des revendications 1 à 3, dans lequel ladite source de gaz sous pression comprend un gaz mis en pression par la soufflante (11) et séparé dudit écoulement de gaz primaire (70).

5. Appareil de distribution de combustible dans un renforçateur de poussée (18) d'un turbomoteur, dans lequel le renforçateur de poussée (18) comprend un côn avant (30) centré sur l'axe médian de rotation (26) du moteur, et un carter (32), ayant une chemise intérieure (34) et une paroi extérieure (36) essentiellement concentriques audit cône avant, ledit appareil compr nant :

une pluralité d'aubes (38), réparties de manière circonférentielle à l'intérieur dudit renforçateur de poussée, et s'étendant radialement vers l'extérieur, dans la direction longitudinale, depuis ledit cône avant jusqu'à ladite chemise intérieure, chacune desdites aubes comprenant une paire de parois latérales (40) et une paroi arrière (42) qui définissent une région intérieure (48), et une pluralité de lumières de passage de combustible (44) et au moins une lumière de passage de gaz sous pression (46) s'étendant à travers lesdites parois latérales desdites aubes ;

dans lequel ledit gaz sous pression admis dans ladite région intérieure de ladite aube s'écoule à travers lesdites lumières de passage de gaz sous pression et pénètre dans l'écoulement de gaz primaire traversant ladite aube, dans une direction essentiellement perpendiculaire audit écoulement de gaz primaire ;

au moins un distributeur de combustible (50), disposé dans ladite région intérieure de chacune desdites aubes, et ayant une pluralité d'orifices (60) pour distribuer le combustible, dans lequel lesdits orifices sont alignés avec lesdites lumières de passage de combustible (44), de telle sorte que le combustible admis dans lesdits distributeurs de combustible s'écoule à travers lesdits orifices (60) et lesdites lumières de passage de combustible (44) et pénètre dans ledit chemin d'écoulement de gaz primaire dans une direction sensiblement perpendiculaire audit écoulement de gaz primaire ;

dans lequel ladite au moins une lumière de passage de gaz sous pression (46) est positionnée adjacente à et à l'avant de toutes lesdites lumières de passage de combustible (44), à une position particulière ; et ledit gaz sous pression pénétrant dans ledit écoulement de gaz primaire, à l'avant dudit combustible, crée un sillage à petite vitesse qui permet la distribution circonférentielle dudit combustible.

6. Appareil selon la revendication 5, dans lequel ladite paroi arrière (42) de chacune desdites aubes est disposée de telle sorte que, lors de l'utilisation, un sillage à petite vitesse soit créé immédiatement à l'arrière de ladite aube lorsque ledit écoulement de gaz primaire passe à travers elle.

7. Appareil s lon la rev ndication 5 ou 6, dans lequel ladite source de gaz sous pression est un flux se-

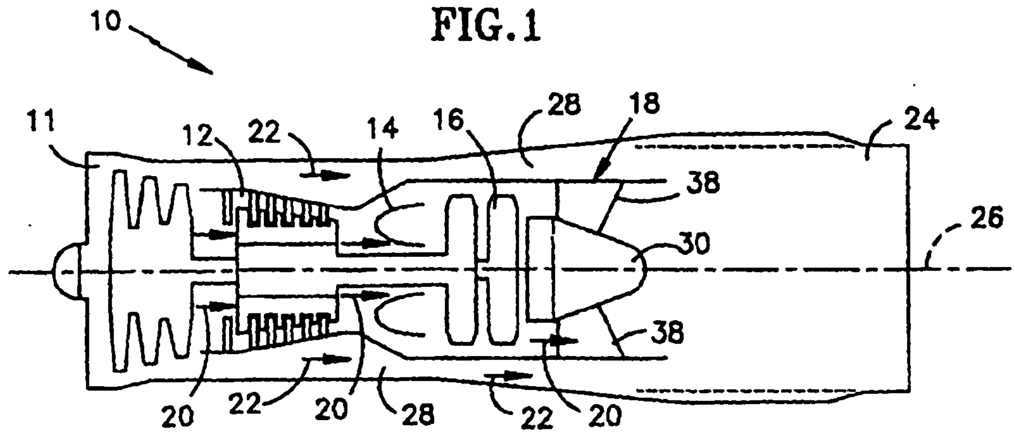
condair créé par une soufflante disposée à l'avant et séparé dudit écoulement de gaz primair .

8. Renforçateur de poussée pour un turbomoteur, comprenant un appareil de distribution de combustible selon l'une quelconque des revendications 5 à 7.

9. Turbomoteur, comprenant :

   une soufflante (11), disposée à une extrémité avant dudit moteur ;
   un compresseur (12) ;
   une turbine (16) ; et
   un renforçateur de poussée (18) selon la revendication 8.

FIG.1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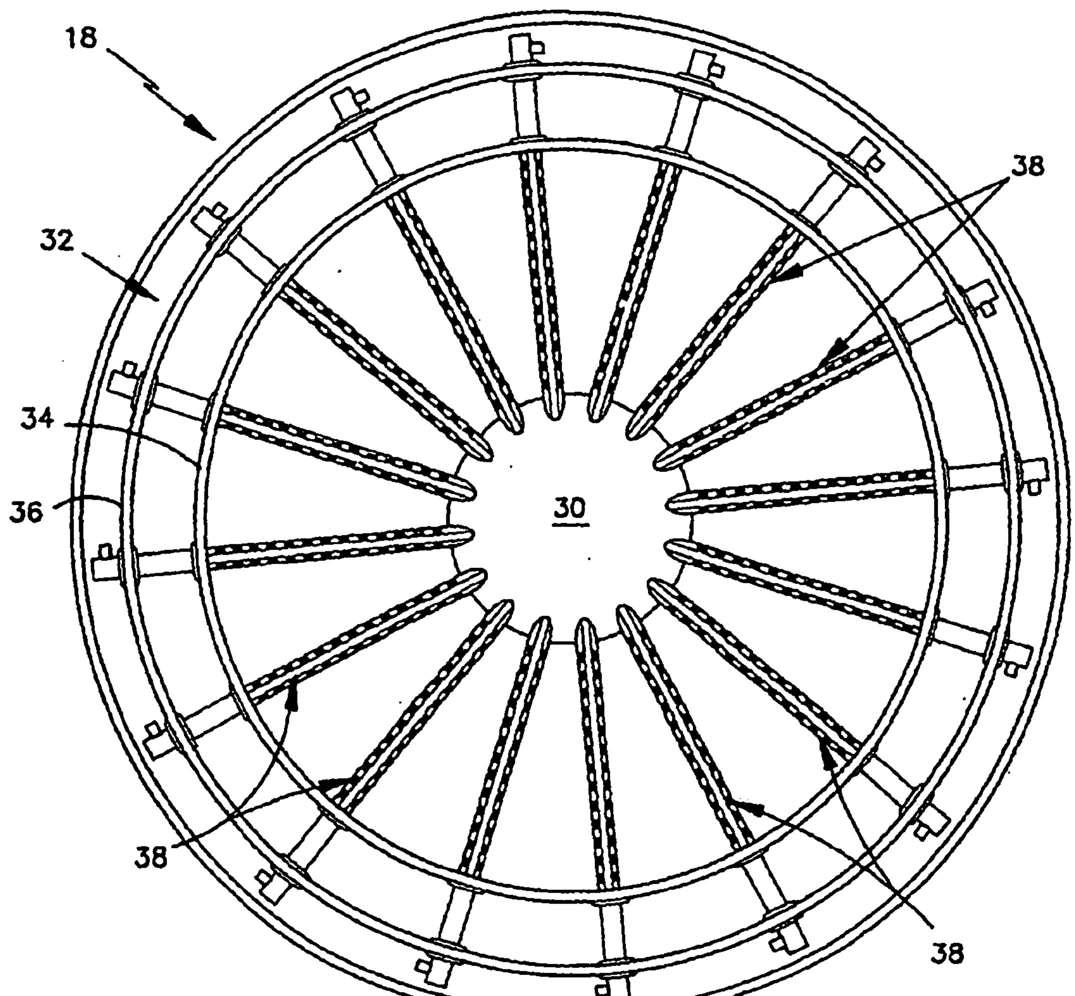
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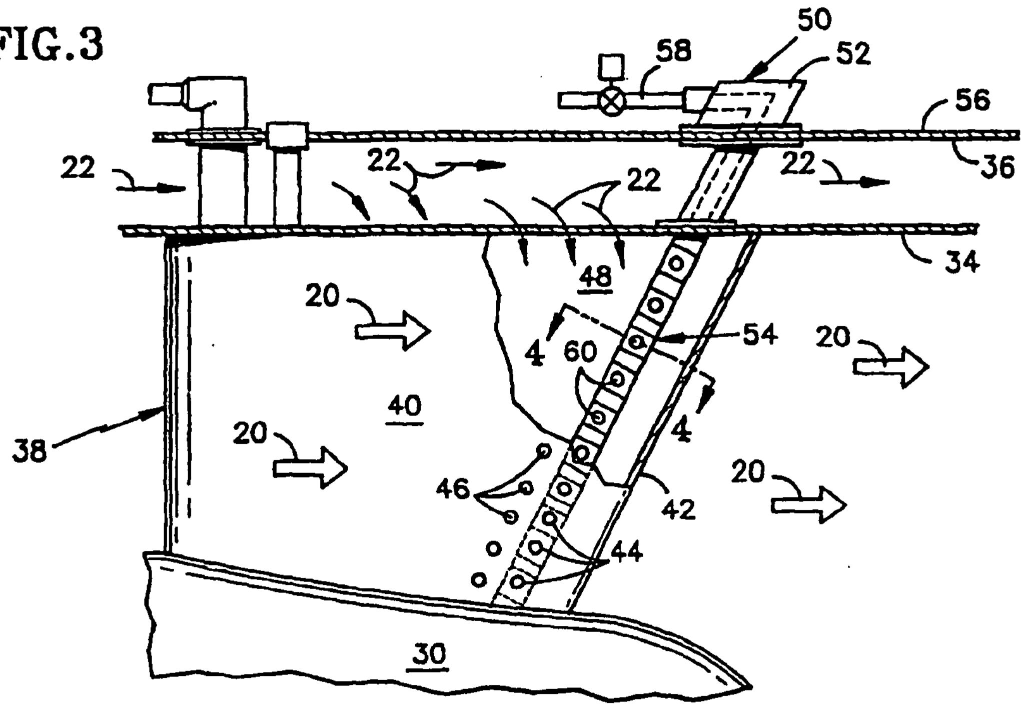
FIG.2

FIG.3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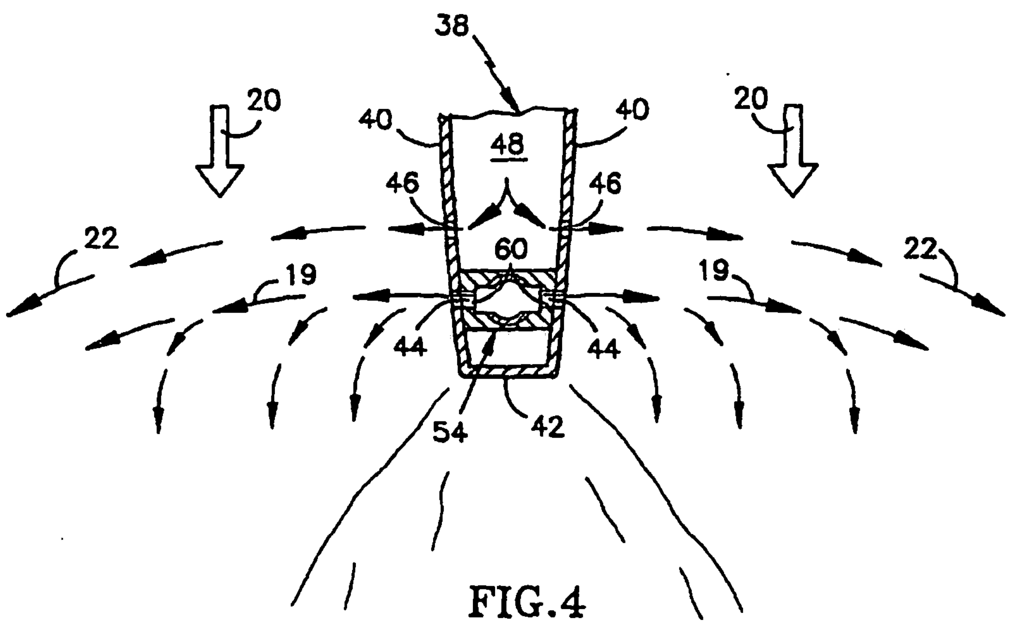
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FIG.4